EXPERIMENTS IN HYDROCORTISONE IONIZATION

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Recently there has been an attempt to assess the usefulness of hydrocortisone when administered by ionization, and the report of one of the first patients treated in this way nearly ten years ago is therefore of interest. At this time it was extremely difficult to get supplies of cortisone in view of the demands which followed the first glowing reports from America of this new "miracle" drug and its related compound hydrocortisone. It speaks highly of the standing of the Physiotherapy Department, Hammersmith Hospital (Postgraduate Medical School), and its Superintendent, Miss M. L. Morris, that sufficient hydrocortisone was made available for even one experiment.

CASE REPORT

It was decided to give hydrocortisone ionization to a patient suffering from rheumatoid arthritis, as these patients had shown the best responses to local injection.

A female patient, 38 years old, in my care, was chosen and was told the nature of the experiment. She had acute symptoms in both knees, but with little or no pain in other joints more commonly affected. Knees were considered appropriate to the trial, as the range of movement is easily assessed and the size of the joint facilitates the application.

Three treatments were given, using soluble hydrocortisone (12·5 mgm.), to the left knee, with the anode as the active electrode. There was slight skin irritation on the third day, although the pads were moved to a fresh area of skin each time. Galvanism was given to the right knee, which was used as a control.

Immediately after the third treatment the patient enjoyed the first pain-free movement she had experienced in some considerable time. There was no improvement in the right knee, either then or later. Freedom from pain lasted for two months, when it returned with its previous severity. An intra-articular injection of 100 mgm. of hydrocortisone was given (the patient was not informed of the nature of this injection); no relief of pain was gained by this.

DISCUSSION

These observations raise some interesting questions. Firstly, if, as we are taught, all special ions introduced through the skin are

carried away by the superficial blood vessels and lymphatics, why were the deeper lying structures of the knee joint apparently affected? Secondly, if the hydrocortisone was removed in the blood stream and exerted its effect through this medium, why was there no corresponding improvement in the right knee? Thirdly, was the benefit of the ionization mainly of a psychological nature, and attributable to the conditioning of the patient to expect improvement as a result of our obvious interest and current newspaper publicity for cortisone? There is also the possibility that ionization is less traumatic than an injection, so that, other things being equal, it might be more efficacious.

Although the treatment proved so successful, at one-tenth the cost of using injection therapy, no further experiments were carried out during my stay at Hammersmith Hospital, and little more was heard of this form of treatment until 1958, when the method was used again in slightly different form in Birmingham.

The first experiment was very much a "shot in the dark", as we had no knowledge of the electrolytic qualities of hydrocortisone, nor did we know whether we were wasting our time by using the anode as the active electrode. Laboratory experiments later proved that we could have used either electrode, as hydrocortisone will pass through an animal membrane, and, although it is not electrically charged, the rate of diffusion is increased by the application of an electrical current.

In the Birmingham experiments (Dixon, 1959) hydrocortisone sodium succinate was used in the form of a 1% jelly. This compound has the property of ionizing into a positively charged sodium ion and a negatively charged hydrocortisone succinate ion.

It was found that using this substance under the anode gave the best results. A total of sixty patients with superficial lesions were treated, and Miss Dixon, in her brief summary, gives the improvement gained as "fair" to "rapid", the average number of treatments being 4·4.

Most of the cases (48) were of tenosynovitis, tennis elbow and chronic strains and sprains, but unfortunately there is no discussion of the response to treatment according to the lesion treated.

A point of greater itnerest is the use of hydrocortisone sodium succinate under the anode. As previously mentioned, this substance ionizes into a positively charged sodium ion and a negatively charged hydrocortisone succinate ion. It would therefore appear that in effect the treatment consisted of sodium ionization, with the hydrocortisone succinate being driven uselessly into the pad.

CONCLUSION

It is concluded that the questions posed above are still unanswered, and that there is considerable scope for more detailed work in this field. It would indeed be a pity if the well-known anti-inflammatory effect of hydrocortisone were not made use of by physiotherapists, and I agree with Miss Dixon that satisfactory results should follow its use in superficial lesions.

REFERENCE

DIXON, B. N. (1959): "Administration of Hydrocortisone by Ionisation", *Physiotherapy*, 45: 193.